

08-09-00

Practitioner's Docket No. 460-009628-US(PAR)

PATENT A

Preliminary Classification:

Proposed Class:

Subclass:

NOTE: "All applicants are requested to include a preliminary classification on newly filed patent applications. The preliminary classification, preferably class and subclass designations, should be identified in the upper right-hand corner of the letter of transmittal accompanying the application papers, for example 'Proposed Class 2, subclass 129.'" M.P.E.P. § 601, 7th ed.

JC883 U.S. PTO
00/80/80JC886 U.S. PTO
09/634488
08/08/00**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): Satu MAKELA, Jouni SMOLANDER

WARNING: 37 C.F.R. § 1.41(a)(1) points out:

(a) A patent is applied for in the name or names of the actual inventor or inventors.

"(1) The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by § 1.63, except as provided for in § 1.53(d)(4) and § 1.63(d). If an oath or declaration as prescribed by § 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to § 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in § 1.17(i) is filed supplying or changing the name or names of the inventor or inventors."

For (title): METHOD FOR SELECTING A BEARER SERVICE FOR A SERVICE IN A MOBILE TELECOMMUNICATIONS SYSTEM

CERTIFICATION UNDER 37 C.F.R. § 1.10*

(Express Mail label number is mandatory.)

(Express Mail certification is optional.)

I hereby certify that this New Application Transmittal and the documents referred to as attached therein are being deposited with the United States Postal Service on this date August 8, 2000, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EL627419866US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Elaine Mian

(type or print name of person mailing paper)

Elaine Mian

Signature of person mailing paper

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. § 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.***WARNING:** Each paper or fee filed by "Express Mail" must have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. § 1.10(b).

"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will not be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

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1. Type of Application

This new application is for a(n)

(check one applicable item below)

- Original (nonprovisional)
- Design
- Plant

WARNING: *Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. § 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.*

WARNING: *Do not use this transmittal for the filing of a provisional application.*

NOTE: *If one of the following 3 items apply, then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.*

- Divisional.
- Continuation.
- Continuation-in-part (C-I-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C. §§ 119(e), 120, or 121)

NOTE: *A nonprovisional application may claim an invention disclosed in one or more prior filed copending nonprovisional applications or copending international applications designating the United States of America. In order for a nonprovisional application to claim the benefit of a prior filed copending nonprovisional application or copending international application designating the United States of America, each prior application must name as an inventor at least one inventor named in the later filed nonprovisional application and disclose the named inventor's invention claimed in at least one claim of the later filed nonprovisional application in the manner provided by the first paragraph of 35 U.S.C. § 112. Each prior application must also be:*

- (i) An international application entitled to a filing date in accordance with PCT Article 11 and designating the United States of America; or*
- (ii) Complete as set forth in § 1.51(b); or*
- (iii) Entitled to a filing date as set forth in § 1.53(b) or § 1.53(d) and include the basic filing fee set forth in § 1.16; or*
- (iv) Entitled to a filing date as set forth in § 1.53(b) and have paid therein the processing and retention fee set forth in § 1.21(l) within the time period set forth in § 1.53(f).*

37 C.F.R. § 1.78(a)(1).

NOTE: *If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.*

WARNING: *If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. §§ 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. §§ 120, 121 or 365(c). (35 U.S.C. § 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. §§ 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.*

WARNING: When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any nonprovisional application claiming benefit of the provisional application must be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. § 1.78(a)(3).

- The new application being transmitted claims the benefit of prior U.S. application(s). Enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

3. Papers Enclosed

- A. Required for filing date under 37 C.F.R. § 1.53(b) (Regular) or 37 C.F.R. § 1.153 (Design) Application**

23 Pages of specification

13 Pages of claims

8 Sheets of drawing

WARNING: DO NOT submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. For comments on proposed then-new 37 C.F.R. § 1.84, see Notice of March 9, 1988 (1990 O.G. 57-62).

NOTE: "Identifying Indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 Inch) down from the top of the page . . ." 37 C.F.R. § 1.84(c).

(complete the following, if applicable)

- The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. § 1.84(b).
- formal
- informal

B. Other Papers Enclosed

6 Pages of declaration and power of attorney

1 Pages of abstract

 Other

4. Additional papers enclosed

- Amendment to claims
- Cancel in this applications claims _____ before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)
- Add the claims shown on the attached amendment. (Claims added have been numbered consecutively following the highest numbered original claims.)
- Preliminary Amendment
- Information Disclosure Statement (37 C.F.R. § 1.98)
- Form PTO-1449 (PTO/SB/08A and 08B)
- Citations

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- Declaration of Biological Deposit
 Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.
 Authorization of Attorney(s) to Accept and Follow Instructions from Representative
 Special Comments
 Other

5. Declaration or oath (including power of attorney)

NOTE: A newly executed declaration is not required in a continuation or divisional application provided that the prior nonprovisional application contained a declaration as required, the application being filed is by all or fewer than all the inventors named in the prior application, there is no new matter in the application being filed, and a copy of the executed declaration filed in the prior application (showing the signature or an indication thereon that it was signed) is submitted. The copy must be accompanied by a statement requesting deletion of the names of person(s) who are not inventors of the application being filed. If the declaration in the prior application was filed under § 1.47, then a copy of that declaration must be filed accompanied by a copy of the decision granting § 1.47 status or, if a nonsigning person under § 1.47 has subsequently joined in a prior application, then a copy of the subsequently executed declaration must be filed. See 37 C.F.R. §§ 1.63(d)(1)-(3).

NOTE: A declaration filed to complete an application must be executed, identify the specification to which it is directed, identify each inventor by full name including family name and at least one given name, without abbreviation together with any other given name or initial, and the residence, post office address and country or citizenship of each inventor, and state whether the inventor is a sole or joint inventor. 37 C.F.R. § 1.63(a)(1)-(4).

Enclosed

Executed by

(check all applicable boxes)

- inventor(s).
 legal representative of inventor(s).
37 C.F.R. §§ 1.42 or 1.43.
 joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.
 This is the petition required by 37 C.F.R. § 1.47 and the statement required by 37 C.F.R. § 1.47 is also attached. See item 13 below for fee.

Not Enclosed.

NOTE: Where the filing is a completion in the U.S. of an International Application or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

- Application is made by a person authorized under 37 C.F.R. § 1.41(c) on behalf of all the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 C.F.R. § 1.16(e) can be filed subsequently).

- Showing that the filing is authorized.
(not required unless called into question. 37 C.F.R. § 1.41(d))

6. Inventorship Statement

WARNING: If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.

The inventorship for all the claims in this application are:

The same.

or

- Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,
- is submitted.
- will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. An English translation of the non-English language application and the processing fee of \$130.00 required by 37 C.F.R. § 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 C.F.R. § 1.52(d).

English

Non-English

- The attached translation includes a statement that the translation is accurate. 37 C.F.R. § 1.52(d).

8. Assignment

An assignment of the invention to Nokia Mobile Phones Ltd.

-
- is attached. A separate "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or FORM PTO 1595 is also attached.

will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters-one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: A newly executed "CERTIFICATE UNDER 37 C.F.R. § 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.

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9. Certified Copy

Certified copy(ies) of application(s)

Country	Appn. No.	Filed
Finland	19991692	9 August 1999
Country	Appn. No.	Filed
Country	Appn. No.	Filed
from which priority is claimed		

- is (are) attached.
 will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 C.F.R. § 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. § 120 is itself entitled to priority from a prior foreign application, then complete Item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. Fee Calculation (37 C.F.R. § 1.16)**A. Regular application**

CLAIMS AS FILED				
Number filed	Number Extra	Rate	Basic Fee 37 C.F.R. § 1.16(a) \$ 690.00	
Total				
Claims (37 C.F.R. § 1.16(c))	50 - 20 =	30 × \$ 18.00	540.00	
Independent				
Claims (37 C.F.R. § 1.16(b))	8 - 3 =	5 × \$ 78.00	390.00	
Multiple dependent claim(s), if any (37 C.F.R. § 1.16(d))				
		+ \$260.00		

- Amendment cancelling extra claims is enclosed.
 Amendment deleting multiple-dependencies is enclosed.
 Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 C.F.R. § 1.16(d).

Filing Fee Calculation \$ 1,620.00

**B. Design application
(\$310.00—37 C.F.R. § 1.16(f))**

Filing Fee Calculation \$ _____

**C. Plant application
(\$480.00—37 C.F.R. § 1.16(g))**

Filing fee calculation \$ _____

11. Small Entity Statement(s)

- Statement(s) that this is a filing by a small entity under 37 C.F.R. § 1.9 and 1.27 is (are) attached.

WARNING: "Status as a small entity must be specifically established in each application or patent in which the status is available and desired. Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. The refiling of an application under § 1.53 as a continuation, division, or continuation-in-part (including a continued prosecution application under § 1.53(d)), or the filing of a reissue application requires a new determination as to continued entitlement to small entity status for the continuing or reissue application. A nonprovisional application claiming benefit under 35 U.S.C. § 119(e), 120, 121, or 365(c) of a prior application, or a reissue application may rely on a statement filed in the prior application or in the patent if the nonprovisional application or the reissue application includes a reference to the statement in the prior application or in the patent or includes a copy of the statement in the prior application or in the patent and status as a small entity is still proper and desired. The payment of the small entity basic statutory filing fee will be treated as such a reference for purposes of this section." 37 C.F.R. § 1.28(a)(2).

WARNING: "Small entity status must not be established when the person or persons signing the . . . statement can unequivocally make the required self-certification." M.P.E.P., § 509.03, 6th ed., rev. 2, July 1996 (emphasis added).

(complete the following, if applicable)

- Status as a small entity was claimed in prior application

_____ / _____, filed on _____, from which benefit is being claimed for this application under:

- 35 U.S.C. § 119(e),
 120,
 121,
 365(c),

and which status as a small entity is still proper and desired.

- A copy of the statement in the prior application is included.

Filing Fee Calculation (50% of A, B or C above)

\$_____

NOTE: Any excess of the full fee paid will be refunded if small entity status is established and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under § 1.136. 37 C.F.R. § 1.28(a).

12. Request for International-Type Search (37 C.F.R. § 1.104(d))

(complete, if applicable)

- Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

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13. Fee Payment Being Made at This Time

Not Enclosed

No filing fee is to be paid at this time.

(This and the surcharge required by 37 C.F.R. § 1.16(e) can be paid subsequently.)

Enclosed

Filing fee \$ 1,620.00

Recording assignment

(\$40.00; 37 C.F.R. § 1.21(h))

*(See attached "COVER SHEET FOR
ASSIGNMENT ACCOMPANYING NEW
APPLICATION".)*

\$ 40.00

Petition fee for filing by other than all the inventors or person on behalf of the inventor where inventor refused to sign or cannot be reached

(\$130.00; 37 C.F.R. §§ 1.47 and 1.17(l))

\$ _____

For processing an application with a specification in

a non-English language

(\$130.00; 37 C.F.R. §§ 1.52(d) and 1.17(k))

\$ _____

Processing and retention fee

(\$130.00; 37 C.F.R. §§ 1.53(d) and 1.21(l))

\$ _____

Fee for international-type search report

(\$40.00; 37 C.F.R. § 1.21(e))

\$ _____

NOTE: 37 C.F.R. § 1.21(l) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 C.F.R. § 1.53(f) and this, as well as the changes to 37 C.F.R. §§ 1.53 and 1.78(a)(1), indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of § 1.21(l) must be paid, within 1 year from notification under § 53(f).

Total fees enclosed

\$ 1,660.00

14. Method of Payment of Fees

Check in the amount of \$ 1,660.00

Charge Account No. _____ in the amount of
\$ _____

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 C.F.R. § 1.22(b).

15. Authorization to Charge Additional Fees

WARNING: If no fees are to be paid on filing, the following items should not be completed.

WARNING: Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

- The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 16-1350.

- 37 C.F.R. § 1.16(a), (f) or (g) (filling fees)
 37 C.F.R. § 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid on these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

- 37 C.F.R. § 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)
 37 C.F.R. § 1.17(a)(1)–(5) (extension fees pursuant to § 1.136(a)).
 37 C.F.R. § 1.17 (application processing fees)

NOTE: "...A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

- 37 C.F.R. § 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. § 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

NOTE: 37 C.F.R. § 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . the issue fee. . ." From the wording of 37 C.F.R. § 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

16. Instructions as to Overpayment

NOTE: "...Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

- Credit Account No. 16-1350
 Refund

DRAFT COPY

SEND ALL CORRESPONDENCE TO:



SIGNATURE OF PRACTITIONER

Clarence A. Green

(type or print name of attorney)

PERMAN & GREEN, LLP

P.O. Address

425 Post Road, Fairfield, Connecticut 06430

(New Application Transmittal [4-1]—page 10 of 11)

Incorporation by reference of added pages

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

- Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added _____

- Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added _____

- Plus added pages deleting names of inventor(s) named in prior application(s) who is/are no longer inventor(s) of the subject matter claimed in this application.

Number of pages added _____

- Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added _____

Statement Where No Further Pages Added

(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)

- This transmittal ends with this page.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Express Mail No.: EL627419866US

In re Application of: MAKELA et al.

SERIAL NUMBER: EXAMINER:

FILING DATE: Herewith ART UNIT:

TITLE: METHOD FOR SELECTING A BEARER SERVICE FOR A SERVICE
IN A MOBILE TELECOMMUNICATIONS SYSTEM

ATTORNEY DOCKET NO.: 460-009628-US(PAR)

The Commissioner of Patents and Trademarks

Washington, D.C. 20231

PRELIMINARY AMENDMENT

Dear Sir:

Please amend the above-identified, enclosed patent application as follows:

IN THE CLAIMS:

Please amend Claims 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20,
28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 44, 45, 46 and 47 as shown
below.

Claim 3, line 1, delete "or 2".

Claim 4, line 1, delete "2 or 3,".

Claim 5, line 1, delete "any of claims 1-4" and insert --claim 1--.

Claim 6, line 1, delete "any of claims 1-5" and insert --claim 1--.

Claim 7, line 1, delete “any of claims 1-6” and insert --claim 1--.

Claim 8, line 1, delete “any of claims 1-7” and insert --claim 1--.

Claim 9, line 1, delete “any of claims 1-8” and insert --claim 1--.

Claim 10, line 1, delete “any of claims 1-10” and insert --claim 1--.

Claim 11, line 1, delete “any of claims 1-8” and insert --claim 1--.

Claim 12, line 1, delete “any of claims 1-11” and insert --claim 1--.

Claim 13, line 1, delete “any of claims 1-12” and insert --claim 1--.

Claim 14, line 1, delete “any of claims 1-12” and insert --claim 1--.

Claim 15, line 1, delete “any of claims 1-14” and insert --claim 1--.

Claim 16, line 1, delete “any of claims 1-15” and insert --claim 1--.

Claim 17, line 1, delete “any of claims 1-16” and insert --claim 1--.

Claim 18, line 1, delete “any of claims 1-17” and insert --claim 1--.

Claim 19, line 1, delete “any of claims 1-18” and insert --claim 1--.

Claim 20, line 1, delete “any of claims 1-19” and insert --claim 1--.

Claim 28, line 1, delete “or 27”.

PCT/US2013/024560

Claim 29, line 1, delete “27 or 28.”.

Claim 30, line 1, delete “any of claims 26-29” and insert --claim 26--.

Claim 31, line 1, delete “any of claims 26-30” and insert --claim 26--.

Claim 32, line 1, delete “any of claims 26-31” and insert --claim 26--.

Claim 33, line 1, delete “any of claims 26-32” and insert --claim 26--.

Claim 34, line 1, delete “any of claims 26-33” and insert --claim 26--.

Claim 35, line 1, delete “any of claims 26-34” and insert --claim 26--.

Claim 36, line 1, delete “any of claims 26-35” and insert --claim 26--.

Claim 37, line 1, delete “any of claims 26-36” and insert --claim 26--.

Claim 38, line 1, delete “any of claims 26-37” and insert --claim 26--.

Claim 39, line 1, delete “any of claims 26-38” and insert --claim 26--.

Claim 40, line 1, delete “any of claims 26-39” and insert --claim 26--.

Claim 41, line 1, delete “any of claims 26-40” and insert --claim 26--.

Claim 44, line 1, delete “or 43”.

Claim 45, line 1, delete “43 or 44.”.

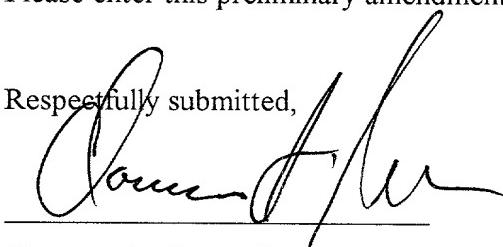
Claim 46, line 1, delete "43, 44 or 45,".

Claim 47, line 1, delete "43, 44, 45 or 46,".

REMARKS

Please enter this preliminary amendment, prior to calculation of the fees.

Respectfully submitted,



Clarence A. Green, Reg. No. 24,622

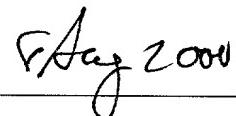
Perman & Green, LLP

425 Post Road

Fairfield, CT 06430

(203) 259-1800

Customer No. 2512



Date

Method for selecting a bearer service for a service in a mobile telecommunications system

- 5 The invention applies generally to a method for selecting a bearer service for communication between a mobile terminal and a mobile network, in which method at least one bearer service is implemented in the mobile network. The invention also applies to a communication system which comprises at least a mobile terminal, a mobile network, at
10 least one bearer service implemented in the mobile network, and means for selecting a bearer service for communication between said mobile terminal and said mobile network. The invention further applies to a mobile terminal for use in a communication system which comprises at least a mobile network, at least one bearer service
15 implemented in the mobile network, and means for selecting a bearer service for communication between said mobile terminal and said mobile network.
- 20 The term "mobile communication system" refers generally to any communication system which enables a wireless communication connection between a mobile station (MS) and the fixed parts of the system when the user of the mobile station is moving within the service area of the system. A typical mobile communications system is the public land mobile network (PLMN). The majority of mobile communication
25 systems in use at the time of filing this patent application belong to the second generation of such systems, a well-known example being the GSM system (Global System for Mobile Telecommunications). The invention applies advantageously to the next or third generation of mobile communication systems. The general packet radio service
30 GPRS, a new service under development for the GSM mobile communication system and the 3rd generation Universal Mobile Telecommunications System, which is currently undergoing standardization, will be used as examples.
- 35 The functional environment of the GPRS system comprises one or more subnetwork service areas, which are connected to form a GPRS backbone network (Fig. 1a). The subnetwork comprises numerous support nodes (SN), of which serving GPRS support nodes (SGSN) will

be used as an example in this specification. The serving GPRS support nodes are connected to the mobile communication network (typically to a base station via an interface unit) in such a way that they can provide packet switching services for wireless communication devices via base stations (cells). The mobile communication network provides packet-switched data transmission between the support node and the wireless communication device. Different subnetworks may be, in turn, connected to external data networks, for example to a public switched data network (PSDN), via GPRS gateway support nodes (GGSN).

Thus, the GPRS service enables packet-format data transmission between a wireless communication device and an external data network, wherein certain parts of the mobile communication network form an access network. Some examples of applications utilising packet-format data transmission are Internet telephony, video conferencing, file transfer and WWW browsing.

In third-generation systems, the concepts of a bearer service and a service are used. A bearer service is a type of telecommunication service that provides the capability for the transmission of signals between access points. A bearer service generally corresponds to the older concept of a traffic channel, defining for example the use of data rate and quality of service (QoS) that will be provided by the system for transferring information between a mobile station and some other part of the system. For example, a bearer service between the mobile station and a base station is a radio bearer service, and a bearer service between a radio network controller and a core network is e.g. an Iu bearer service (Interface UMTS bearer). In the UMTS system the interface between a radio network controller and a core network is called the Iu interface. In this context a service is provided by a mobile communication network in order to fulfil some task(s), e.g. data services carry out data transfer in the communication system, call services are associated with phone calls, multimedia, etc. Therefore a service necessitates information transfer between a mobile station and the fixed parts of the system, like a phone call or the transfer of a text message. A major task in the operation of a third-generation mobile telecommunications system is to manage (set up, maintain and terminate, as necessary) the bearer services so that each requested

service can be provided to mobile stations without wasting the available bandwidth.

- 5 The quality of service level defines, for instance, how packet data units (PDU) are handled in the GPRS network during transmission. For example, the quality of service levels defined for the connection addresses are used to control the order of transmission, buffering (packet queues) and discarding of packets in support nodes and in gateway support nodes, especially when there are two or more
10 connections which have packets to be transmitted simultaneously. Different quality of service levels define, for example, different delays for packet transmissions between different ends of the connection, as well as different bit rates. The number of discarded packet data units can also vary in connections having different quality of service levels.
15
- 15 For each connection, it is possible to request a different quality of service level. For example in e-mail connections, a relatively long delay can be allowed in the message transmission. However, interactive applications, such as video conferencing for example, require high-speed packet transmission. In some applications, as in file transfer, it is important that the packet transmission is error free, wherein packet data units are re-transmitted in error situations, if necessary.
20
- 25 It has been suggested that four different traffic classes be defined in the packet transmission service of the UMTS system, and as for the features of these traffic classes, the aim has been to take into account the different criteria for the different connection types. One criterion defined for the first and the second class is the real-time quality of the data transmission, wherein significant delays must not occur in the
30 transmission. However, the accuracy of the data transmission is not such an important criterion. Correspondingly, for the third and fourth traffic classes, non-real-time data transmission is sufficient, but relatively accurate packet transmission is required. An example of real-time first-class data transmission is the transmission of speech signals in a situation where two or more people discuss with each other via wireless communication devices. An example of a situation where real-time second-class data transmission could be possible, is the transmission of a video signal for immediate viewing. Third-class, non-real-time
35

packet communication can be utilised for example for the use of database services, such as browsing Internet home pages, in which data transmission with moderate speed and accuracy is a more important factor than real-time data transmission. In the fourth class of this example system, it is possible to categorise for instance the transfer of e-mail messages and files. It is obviously not necessary to have four said traffic classes, but the invention can be applied in packet transmission systems containing any number of traffic classes. Further, the present invention can also be applied in circuit switched systems. The properties of the four proposed traffic classes are summarized in table 1.

Class	First class: real-time, <i>e.g.</i> telephone conversation -guaranteed capacity -no acknowledgement	Second class (business class): real-time, <i>e.g.</i> video information -guaranteed capacity -acknowledgement possible -buffering on application level	Third class (tourist class): interactive best effort method -acknowledgement -Internet browser, Telnet -real-time control channel	Fourth class (cargo class): background transmis- sion with best effort method -acknowledgement -background download of e-mail messages, calendar events, etc.
Delay	100 ms, 200 ms, 300 ms	< 1 s	2 s	Not defined
Bit error rate	$10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}$	$10^{-5}, 10^{-6}, 10^{-7}, 10^{-9}$	$<10^{-9}$	$<10^{-9}$
Max bit rate	Defined	Defined	Not defined	Not defined
User priority	High, medium, low	High, medium, low	High, medium, low	High, medium, low

TABLE 1

Modern second and third generation mobile stations have much more efficient data processing properties than older mobile stations. There is already, for example, a possibility to make a connection to the Internet and to use a browser application in the mobile station to obtain information from the Internet, and in future it will be possible to establish multimedia calls with *e.g.* real-time video conferencing and the like. Therefore, such mobile stations will be designated as mobile terminals hence forward in this description. The term mobile terminal

should also be understood to include so-called "radio cards" which comprise mobile telephone circuitry integrated into a circuit card. Such radio cards can be removably connected, for example via a PCMCIA interface, to data processing devices, such as portable or laptop computers, in order to provide mobile telephone functionality or data transfer capability via a radio communication network.

To allow the use of different applications in such a mobile terminal, there will be provided an execution environment for external applications, hereafter abbreviated as execution environment in this description. Such external applications are not necessarily provided only by the manufacturer of the mobile terminal but some third party manufacturers may also provide such applications. To assure compatibility between mobile terminals and external applications, the mobile application execution environment (MExE) standard is under development. The present invention is not restricted to the mobile application execution environment standard but it can also be applied with other suitable execution environments for mobile terminals.

The user of a mobile terminal can have access to many kinds of service via a mobile telecommunication network using the mobile terminal. There is an enormous number of service providers connected to e.g. the Internet network. They provide many kinds of services, such as database services, other information searching services, telephone applications, video applications, networked games etc. The user initiates a service request by starting a desired application using the terminal user interface. In the mobile terminal, the execution environment is activated by the service request and also the requested application is activated. The terminal makes a connection via the mobile network to the Internet network or some other network where the desired service exists.

The requirements of different applications may differ significantly. Some applications require fast communication between sender and receiver. Such applications are, for example, video and telephone applications. Some other applications may require as error-free communication as possible, but the bit rate of the communication connection is less important. Such applications include e-mail and database applications.

Therefore, there is a problem in using these kinds of applications in mobile terminals, namely how to select the optimum bearer service for a particular communication task. In future mobile networks, it is likely that the service requirements of users will differ greatly, depending on
5 the capabilities of the terminals they use, the applications they want to run, the capabilities of networks and the kind of user subscription they have.

In present systems, some applications contain information on what kind
10 of bearer services they need. The bearer selection can be based on the destination server, which can be e.g. a so-called World Wide Web server (WWW) communicating with the Internet network. The selection of a bearer service is driven by the network address of the server being contacted and the network protocol being used.
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Many mobile terminals communicate with networks using more than
20 one bearer service. The network operator and/or user may wish to program the mobile terminal to use a specific bearer service in order to optimise a particular function, for example network loading, response times, etc.

At the present time the choice of a bearer service is typically driven by
25 the application being used. The user or network operator may categorise applications by their use of bearer services.

These previously known systems all involve some inherent disadvantages. For example, some applications can be executed in different kinds of terminal where the properties of the terminal affect the demands on the bearer services of the applications being executed.
30 Also, the user may have his/her own demands and preferences which are not taken into account in present systems. Furthermore, there may also be some situations in which the mobile network may not be able to provide all bearer services, for example when the network is overloaded.
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In present systems, the mobile terminal and the mobile network negotiate the bearer service. If the network cannot provide the requested bearer service, probably the quality of service provided for

the communication is not appropriate. Let us assume that there exists a video application where the resolution of the video is quite high, e.g. 800×640 pixels. If the user wishes to execute this video application with a mobile terminal which has means to connect via a high-speed circuit-switched data connection (HSCSD bearer service) and the mobile terminal is locally connected to a laptop PC which has a display with a resolution of at least the mentioned 800×640 , the application may be executed with its default resolution. If the user only has a mobile terminal which comprises a lower resolution display, for example 640×480 , the application will still try to request a bearer service for the maximum resolution (800×640), although a bearer service for smaller resolution (640×480) would be adequate.

There are also other criteria which affect the requirements of the bearer service needed. In another example, a mobile terminal can be used as a remote terminal for a server. The mobile terminal and the server need to exchange some data. The type of server for which the mobile terminal is used as a remote terminal may vary and so may the properties of the server. For example, the communication speed may differ. Therefore there can be different criteria for the selection of bearer service depending on properties of the server in question.

It is also possible that two mobile terminals are communicating with each other and must select bearer services. The selection of an appropriate bearer service depends *inter alia* on the properties of both mobile terminals and the properties of the mobile networks with which the mobile terminals are communicating.

The user may also visit the area of a mobile network other than his/her home mobile network. In the visited mobile network the bearer services that may be selected may vary from those of the home mobile network. The pricing policy may also differ.

It is thus an object of this invention to provide a method and a system for selecting a bearer service for an application in a mobile telecommunications system so that the selected bearer service advantageously has the optimum features to fulfil the demands for the application being run, as well as the user's demands, to cater for the

properties of the mobile terminal and the properties and criteria set by the mobile network.

The objects of the invention are fulfilled by taking into account the requirements of the application, the user, the terminal being used, and the network. A method according to a first embodiment of the present invention is characterized by what is disclosed in the characterising part of the appended claim 1. A method according to a second embodiment of the present invention is characterized by what is disclosed in the characterising part of the appended claim 21. A method according to a third embodiment of the present invention is characterized by what is disclosed in the characterising part of the appended claim 25. A communication system according to the present invention is characterized by what is disclosed in the characterising part of the appended claim 26. A mobile terminal according to the present invention is characterized by what is disclosed in the characterising part of the appended claim 42. A bearer service selection application interface according to the present invention is characterized by what is disclosed in the characterising part of the appended claim 48. A network element according to a first embodiment of the present invention is characterized by what is disclosed in the characterising part of the appended claim 49. A network element according to a second embodiment of the present invention is characterized by what is disclosed in the characterising part of the appended claim 50.

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The present invention provides significant advantages over prior art systems and methods. By using the method according to the invention, an optimum bearer service can be selected, wherein the network loading can be optimised, network services can be provided to as many users as possible, and also the execution of the application is best suited for the respective demands of the user and the properties of the mobile terminal being used.

35 The invention will now be described in more detail in the following with reference to the appended figures, in which

- Fig. 1a shows a system in which the method according to a preferred embodiment of the invention can be applied,
- 5 Fig. 1b shows another system in which the method according to a preferred embodiment of the invention can be applied,
- Fig. 2a shows a diagram describing the method according to a preferred embodiment of the invention,
- 10 Fig. 2b shows a diagram describing the method according to another advantageous embodiment of the invention,
- Fig. 2c shows a diagram describing a method of bearer service renegotiation according to an advantageous embodiment of the invention,
- 15 Fig. 2d shows a diagram describing a method by which two mobile stations in the same mobile network negotiate a bearer service,
- 20 Figs. 3a—3d show examples of advantageous packet formats used in the method according to a preferred embodiment of the invention, and
- 25 Fig. 4 shows a block diagram describing an application programming interface relating to bearer selection.

In the following description of a preferred embodiment of the invention, a UMTS type mobile communication system will be used as an example; however, it will be apparent to someone of ordinary skill in the art that the invention is not restricted solely to this system but can also be applied to other communication systems which may have different bearer services available for communication.

- 35 The operation of the invention will be described in relation to Figs. 1b, 2a and 2b. Figure 1b shows part of a UMTS system comprising a mobile terminal MT1, a radio access node 1 (RAN) consisting of a base station 2 (BS), and a radio network controller 3 (RNC) controlling the

base station 2 and routing the connections between the base station 2 and the rest of the system, a wireless mobile switching centre 4 (WMSC) and a packet data access node 5 (PDAN) as alternative routing possibilities in addition to the radio network controller 3.

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The mobile terminal MT1 comprises *inter alia* a processor CPU, memory means MEM, subscriber identity module (SIM) or respective means which are used for subscriber identification, and a radio part RF for communication with base station 2. The processor CPU can be 10 included for example in an application specific integrated circuit (ASIC, not shown), which can be used to carry out a great amount of the logical functions of the mobile terminal MT1. It is also possible that there is more than one processor CPU in the mobile terminal, but in the following it is assumed that there is only one processor CPU for 15 program execution. The memory means contain advantageously random access memory (RAM), read only memory (ROM), and at least part of the memory of the SIM. The mobile terminal MT1 also comprises a user interface, such as a keypad, a display device and audio means, e.g. a microphone and a loudspeaker, but these are not shown in Fig. 20 1b.

In Fig. 1b, it has been assumed that call management (CM) functions are implemented in the mobile terminal MT1 and both in the WMSC 4 and the PDAN 5. These call management functions provide means for 25 originating a call, maintaining a call and terminating a call. Therefore the mobile terminal MT1 and the WMSC 4 or the PDAN 5 exchange call signalling messages to originate, maintain and terminate a call. The bearer management (BM) and the radio resource management (RM) functions are implemented in the mobile terminal MT1 and in the radio 30 network controller 3. The bearer management functions are e.g. used for selecting one or more logical channels for communication between the mobile terminal MT1 and the base station 2, according to the properties of the selected bearer service. The radio resource management functions are e.g. used for selecting a radio channel for 35 the radio path between the mobile terminal MT1 and the base station BS 2.

A packet data connection between the mobile terminal MT1 and IP network 7 can be established from the packet data access node 5 (PDAN) via a packet data backbone 6 and a packet data gateway 8 (PDG). It is possible to create a circuit-switched data connection
5 between the mobile terminal MT1 and the mobile network via the radio access node 1, the wireless mobile switching centre 4 and a gateway wireless mobile switching centre 9 (GWMSC). This gateway wireless mobile switching centre 9 has means for forming a connection between the mobile network and another network NW2, such as GSM, PSTN or
10 ISDN.

In the following a method according to an advantageous embodiment of the present invention will be described with reference to the diagrams of Figs. 2a, 2b and fig. 4. In the figures 2a and 2b the vertical lines 15 describe functional elements in a method according to an advantageous embodiment. Line 201 represents the application, line 202 the execution environment, line 203 the user, line 204 the mobile terminal capability storage and line 205 represents the serving network.

20 First, the user of the mobile terminal MT1 starts an application in the mobile terminal MT1 e.g. using the user interface of the mobile terminal MT1. Possibly the application could be started remotely. The application is e.g. a networked game. The program code of this application may have been loaded earlier e.g. from a server 10 connected to the IP network and saved into the memory means MEM of the mobile terminal. In the mobile terminal MT1, there is provided an execution environment 202. It is activated by the service request from the user via the application (block 206). The role of the execution environment 202 in the terminal is to collect all the requirements 25 relating to the desired bearer service. The requirements are gathered from the requested application in the terminal, from the terminal (i.e. terminal capability storage 204), from the user and from the network. The execution of the execution environment 202 and the requested application are controlled by the processor CPU of the mobile terminal.

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The application started by the user provides its service requirements to the execution environment 202 (block 207). These application service requirements can be e.g. quality of service parameters, such as

- information about the acceptable delay, bit rate, bit error rate etc, and traffic class, such as UMTS bearer traffic class. The application's service requirements may also include estimated capacity requirements, that is the number of bits to be transferred. The 5 application service requirements in different embodiments can vary from those mentioned above. The application may be capable of indicating the bearer traffic class directly, or it may indicate some preferred quality of service parameters in a consistent manner.
- 10 The logical interface between applications 201 and the execution environment 202 is called a bearer service selection application programming interface BSSAPI. It is represented by an arrow 401 in fig. 4. There are also other means to get information about terminal capabilities and user preferences from the terminal capabilities definition block 403 and the user preferences definition block 405. One other API 402 is arranged between the terminal capabilities definition block 403 and the execution environment 202. Another API 404 is arranged between the user preferences definition block 405 and the execution environment 202. The execution environment 202 15 communicates with the low-level system software 406 of the mobile terminal MT1 via a low-level system API 407.
- 20 Advantageously more than one application can be run simultaneously in the mobile terminal MT1. A single application may also have more than one connection to the network simultaneously. There is a separate bearer service request process for all separate applications/connections. Therefore each bearer service will be given an identifier in the response from the system.
- 25 Referring once more to figures 2a and 2b, the execution environment 202 may also ask the user for preferences relating to the desired bearer (block 208). Selection of preferences may also be made without user interaction using predefined rules. The execution environment 202 may further request authorisation for automatic service initiation of an alternative bearer, e.g. a more expensive choice. The user may be willing to automatically accept e.g. a more expensive alternative bearer 30 in order to obtain the desired service. The user may reply to such a request e.g. using the user interface of mobile terminal MT1. The reply

is transferred to the execution environment 202 (block 209). At this stage any other user preferences are also taken into account. For example, the subscriber data in the network, e.g. in the home location register 11 (HLR) also contains information about allowed services and preferences (user profiles). The subscriber data may be defined by the network operator and it relates to the user's subscription options.

In another phase the execution environment 202 also gathers information about those capabilities of the mobile terminal MT1 which affect the bearer selection. This information is e.g. the amount of accessible memory, display properties, such as resolution, modem properties, and terminal class. It is also important to know if the mobile terminal MT1 has means for packet switched communication and/or means for circuit-switched communication. In some circumstances the version, manufacturer and model information may be gathered. At least part of this terminal information is stored advantageously in the memory means MEM, for example in ROM or in the SIM. This terminal information is read from the memory means MEM (block 216).

Some information about the terminal may also be stored in the network and can be found based on e.g. the mobile terminal's International Mobile Equipment Identification IMEI-identifier. To gather terminal capability information from the network, the execution environment 202 creates a terminal capability request network message (block 210 in fig. 2b), which is sent to the mobile network and processed there. In the network the request is handled for example by the wireless mobile services switching centre WMSC 4 and the information is collected. Then a reply network message is formed which includes the requested information and this reply network message is sent to the mobile terminal MT1 (block 211).

The execution environment 202 processes the information gathered (e.g. from the application, the mobile terminal MT1, the user and/or network) and based on that information creates a bearer service request network message (block 212). In the processing phase, the execution environment 202 analyses and prioritises the information in order to find the most critical demands. The execution environment 202 also has the ability to deal with and resolve contradictory requirements

and to form an appropriate bearer service request. In the case of contradictory requirements the user can be asked for input. For example, the application may ask for a communication rate of 14400 bit/s, but the modem of the terminal can handle only 9600 bit/s at maximum. In this case the execution environment 202 will advantageously select 9600 bit/s unless the user preferences or user reply prohibit that. The user may e.g. have restricted the communication rate so that it must be over 10000 bit/s. The way in which the execution environment 202 will build up the bearer service request network message depends *inter alia* on the practical implementations but it should be consistent within all mobile terminals communicating with a certain mobile network/telecommunications system.

Fig. 3a presents an advantageous example of the packet format of the bearer service request message 301 by which the application service requirements can be forwarded to the execution environment 202. First, there is a header field 302, which in this example format indicates the beginning of the packet. The value and the length of the header field 302 can vary, but advantageously the header field 302 is standardised so that applications can be run in different mobile terminals MT1.

The header field 302 is followed by parameter fields. These parameter fields can be either variable or fixed length and can include sub-fields. If an application does not have values for all fields and sub-fields, missing parameters are advantageously coded as zeros. It is apparent that the detailed structure of the packet format, i.e. the number of the parameter fields and the number of the sub-fields are used as non-restrictive examples.

In this example the first parameter field 303 is used for QoS information. Advantageously it has a delay sub-field, a bit error rate sub-field and a bit rate sub-field. The second parameter field 304 carries traffic requirement information. The third field 305 is reserved for estimated capacity requirement information. The fourth parameter field 306 is for traffic class information.

It is also possible that the application provides more than one alternative for some or all of the mentioned bearer service parameters. For example, there may be two bit rate -sub-fields in the packet which the application forwards via the BSSAPI to the execution environment 5 202.

Methods similar to those presented above can advantageously be applied to collect the terminal information from the terminal capabilities definition block 403 to the execution environment 202 and the user 10 information from the user preferences definition block 405 to the execution environment 202. However, the detailed structure of the packets to communicate the information may vary. The execution environment 202 will store the parameters in memory means MEM until all parameters relating to bearer service selection are collected.

15 Once a bearer service request network message has been formed, the mobile terminal MT1 advantageously sends a message to the mobile network under which the mobile terminal is in operation (block 213). The area covered by the switching centre that controls the 20 communication between the mobile terminal and the mobile network is called the serving mobile network. The serving mobile network may be the home network of the mobile terminal in question, or some other mobile network (visited mobile network), as is known to a person skilled in the art. The transmission is carried out through the radio path, 25 between the mobile terminal MT1 and at least one base station of the serving mobile network. The bearer service request network message is further communicated to the wireless mobile switching centre 4 of the serving mobile network.

30 The wireless mobile switching centres 4 of the mobile network comprise a database for maintaining information about those mobile terminals which are in operation in the wireless mobile switching centre area. In GSM- and UMTS-systems, that database is called the Visitor Location Register (VLR). The mobile network also comprises a database called 35 the Home Location Register 11 (HLR) where the user's subscription information is stored, including the telephone number, the IMEI of the mobile terminal, etc.

That wireless mobile switching centre 4 which receives the bearer service request network message, examines the content of the message. The wireless mobile switching centre 4 also contacts the home network of the mobile terminal MT1 to examine the user's subscription information (block 214). The user's subscription information may have some restrictions that may affect the selection of the bearer service. There may be e.g. different kinds of mobile subscriptions with different pricing policies. Therefore it is possible that the bearer service request has to be denied completely, or the allowable bearer services for the particular user may limit the selection of the bearer service. The result of examination of the user's subscription information is sent back to the wireless mobile switching centre 4 of the serving mobile network.

- 15 Based on the reply from the home network, the wireless mobile switching centre 4 denies the bearer request or continues the bearer service selection process. In the latter case, or in such a case that the user's subscription information does not affect the selection, the other grounds for the bearer service requested are examined in the serving
20 mobile network, advantageously taking into account the traffic situation and remote network conditions. In this phase the properties of the serving mobile network are compared with the parameters in the request and a suitable bearer service is suggested. The bearer selection may also be affected by the traffic situation of the serving
25 mobile network. If the serving mobile network cannot support the requested bearer service at the time, the request may be denied or another bearer service than requested is suggested. The serving mobile network offers the best possible service, taking into account the mobile terminal, the application and network capabilities, the user
30 preferences, as well as the user's subscription options.

On the basis of the result of the bearer selection process the serving mobile network forms a bearer service reply network message, and sends it to the mobile terminal MT1 that initiated the bearer service selection request (block 215). In the mobile terminal MT1 the execution environment 202 handles this information. At this stage the execution environment 202 does not necessarily accept the suggested bearer service. It may form a message to be shown on the display of the

mobile terminal to inform the user about the suggested bearer service, or possibly a list of bearer services that may be selected. In this context it is also preferable to inform the user of the price of the suggested bearer service. The user can now accept or reject the selection. In
 5 another alternative, the execution environment 202 accepts the suggested bearer service automatically and possibly informs the user of the selection.

Fig. 3b presents an advantageous example of the response packet
 10 format of the bearer service reply message 307. This message is used by the execution environment 202 to inform the application of the bearer that was granted for it through the BSSAPI 401. The packet contains a header field 302 and other fields, for example the identification of bearer field 308 and a details field 309 which contains
 15 details of the granted bearer service, e.g. delay, bit rate, bit error rate, traffic class, etc.

In the bearer service selection process the selected bearer service is next activated in the serving mobile network in question and the
 20 execution of the application can be started. But, if the bearer selection request is denied for some reason, the application is advantageously stopped.

It is possible that there will be a need to change the bearer service for
 25 some reason during communication. For example, the traffic situation in the mobile network can vary and may necessitate changes to some bearer services. The mobile terminal MT1 may also move farther from the base station which may decrease the quality of the radio signal. Therefore e.g. a reduction in bit rate may be needed. In this situation
 30 the network informs the mobile terminal MT1 of the changed conditions by sending e.g. a conditions changed network message (block 217 in fig. 2c). The execution environment 202 forms a renegotiation request network message (block 218) and sends it to the serving mobile network (block 219). In the serving network the renegotiation request network message is examined and a bearer service is reselected, if
 35 possible (block 220). Finally, to complete the renegotiation of the bearer service process, the serving mobile network forms a bearer service reply network message on the basis of the result of the bearer

reselection process, and sends it to the mobile terminal MT1 that initiated the bearer service selection request (block 221). In the mobile terminal MT1 the execution environment 202 transfers a bearer service change message 310 via the BSSAPI 401 to the application which this
 5 change concerns (block 222). One advantageous example of a packet format for the bearer service change message 310 is presented in fig 3c. The packet contains a header field 302, an identity field 308 and a details field 309. The identity field 308 is used to identify the bearer service in question. The details field 309 contains information about the
 10 changed parameters, *e.g.* new delay, new bit rate, etc. The application 201 informs (block 223) the execution environment 202 that the suggested change of the bearer service is either accepted or rejected.

It should be noted here that the network messages exchanged between
 15 the mobile network NW1 and the mobile terminal MT1 are not necessarily the same messages as the messages 301, 307, 310, 311 communicated in the mobile terminal MT1, between the execution environment 202 and the application 201, the terminal capabilities definition block 403 and the user preferences definition block 405, and
 20 the application execution environment.

In the above situation the bearer service can be renegotiated with the mobile terminal MT1 and the mobile network. In this renegotiation process the bearer service selection procedure is very similar to the
 25 bearer service request procedure presented earlier. The main difference is that the identifier of the bearer service to be changed has to be informed to the mobile network.

The need for renegotiation of bearer services can also be due to a
 30 situation, in which the user of the mobile terminal MT1 moves to another operator's mobile network, *i.e.* roaming. There may be limitations on the bearer services available. If such limitations take place and the previous bearer service or services cannot be maintained in the new mobile network, the mobile network should indicate this
 35 situation to the mobile terminal MT1 by using *e.g.* the conditions changed network message 217. The mobile terminal MT1 may then either accept a new bearer service, and perhaps later try to renegotiate to get a better bearer service, or stop the service execution.

It is also possible that the available bearer services in the new mobile network are even better than in the previous mobile network. In some situations the network may have means for informing the mobile terminal of the better bearer service parameters by using e.g. the conditions changed network message.

This above mentioned mechanism can also be used in a situation where the user of the mobile terminal MT1 moves within the same operator's mobile network, but to a sub-area, which has different bearer services available.

There may also be some other situations in which the bearer service is renegotiated. For example, the application may need a faster bit rate or a reduced delay. The application 201 forms a renegotiation request message 311. If the bearer service renegotiation process is initiated by an application 201 running in the mobile terminal MT1, or the user of the mobile terminal MT1, the execution environment 202 forms a renegotiation request network message, which is sent to the mobile network NW1. The execution environment 202 may also check the user preferences and terminal capabilities in this context, or the execution environment may use that information, which was saved in the mobile terminal MT1 when the bearer service was negotiated at the beginning of the communication.

One advantageous example of a packet format for the renegotiation request message 311 is presented in fig 3d. In addition to the parameter fields 303—306 the request message 311 contains an identity field 308, in which the application 201 indicates to the execution environment 202 the identifier of the bearer service to be changed. This identifier of the bearer service does not have to be the same as the identifier which the mobile network has given to the bearer service in question.

The mobile network examines the request and performs all necessary checks, as was described earlier in the description of the present invention (e.g. the network checks user subscription information if not already known, checks the mobile network's own traffic situation and

capabilities and also optionally consults the destination network). Based on those checks, the mobile network either accepts or rejects the renegotiation request and informs the mobile terminal MT1 of the decision.

- 5 In the mobile terminal MT1 the execution environment 202 receives the network reply and informs the result to the application by using e.g. the bearer service change message 310. The application 201 may then either accept or refuse the renegotiated bearer service.

10 It is apparent to a person skilled in the art that the above mentioned phases which are carried out in the mobile terminal MT1, can be implemented as processes or programs of the processor CPU of the mobile terminal MT1. In a similar way the phases which are carried out in the wireless mobile switching centre 4, can be implemented as processes or programs of some processing means (not shown) of the wireless mobile switching centre 4.

15

20 It is also possible that the selection of a suitable bearer service is performed in the mobile terminal MT1, wherein the mobile terminal MT1 requests information of available bearer services from the network. When the mobile terminal MT1 has gathered all the necessary information for selection of the bearer service, the mobile terminal performs the selection and begins a process for activating the selected bearer service in the serving mobile network.

25

30 It may also be possible that the other party of the service execution is not an element in the network but another mobile terminal MT2. This situation may arise, for example, if a user wants to start a video call, or the like, at his mobile terminal with another user's mobile terminal MT2. Fig. 2d describes a method for negotiating a bearer service between two mobile terminals MT1, MT2, which are communicating within the same mobile network NW1. In this kind of mobile-to-mobile case, the mobile terminal MT1 that initiated the call has probably already performed the bearer service negotiation process for the bearer service used during the service session before the actual connection to the called mobile terminal MT2 (blocks 224, 225, 226, 227). When the bearer service is accepted by the application in the mobile terminal

35

- MT1 that initiated the call, it sends to the mobile network NW1 a request to form a connection to the called mobile terminal MT2 (block 228). That request is forwarded through the network to the called mobile terminal MT2 (block 229). Then, the execution environment (or some other system module, for example in lower level call handling software) in the called mobile terminal MT2 checks if the called mobile terminal MT2 is able to use the bearer, which the calling mobile terminal MT1 suggests (block 230).
- 10 The called mobile terminal MT2 performs a bearer service request procedure with the mobile network NW1 and sends a bearer service request network message to the mobile network NW1 (block 231). That WMSC 4 which receives the bearer service request network message, examines the content of the message. Advantageously the subscription information of the called user is also examined (block 232). The user's subscription information may have some restrictions that may affect the selection of the bearer service. There may be e.g. different kinds of mobile subscriptions with different pricing policies. Therefore it is possible that the bearer service request is denied completely, or the 15 allowable bearer services for the particular user of the called mobile terminal MT2 may limit the selection of the bearer service. The result of examination of the called user's subscription information is sent back to the WMSC 4 of the mobile network NW1.
- 20
- 25 Based on the reply from the mobile network NW1, the WMSC 4 denies the bearer request or continues the bearer service selection process. In the latter case, or in such a case that the subscription information of the user of the called mobile terminal MT2 does not affect the selection, the other grounds for the bearer service requested are examined in the 30 mobile network NW1, advantageously taking into account the traffic situation of the serving mobile network. In this phase the properties of the mobile network NW1 are compared with the parameters in the request and a suitable bearer service is suggested. The bearer selection may also be affected by the traffic situation of the mobile 35 network NW1. If the mobile network NW1 cannot support the requested bearer service at the time, the request may be denied or another bearer service than requested is suggested.

On the basis of the result of the bearer selection process the mobile network NW1 forms a bearer service reply network message, and sends it to the called mobile terminal MT2 (block 233). The called mobile terminal MT2 replies to the connection request network message by sending a connection response network message to the mobile network NW1 (block 234).

- This connection response network message is forwarded to the mobile terminal MT1 that initiated the call (block 235). If both mobile terminals
10 MT1, MT2 accepted the proposed bearer service (or services), the connection is established between the mobile terminals MT1, MT2 (block 239).

- If, however, neither mobile terminal MT1 nor MT2 accepted the proposed bearer service(s) (block 236), the bearer selection procedure loops back to beginning (block 224). The mobile terminal MT1 that initiated the call selects new parameters and performs a new bearer service request with new parameters.
15
20 If the called mobile terminal MT2 did not accept the proposed bearer service(s), it may have suggested another bearer service (block 237), wherein the mobile terminal MT1 checks if it can accept the suggested bearer service. If the mobile terminal MT1 accepts the alternative bearer service suggested by the called mobile terminal MT2, the bearer selection procedure loops back to block 225. If the called mobile terminal MT2 did not accept the proposed bearer service(s) and did not suggest another bearer service (block 238), the mobile terminal MT1 either selects and proposes another bearer service, wherein the bearer selection procedure loops back to block 224, or otherwise the
25
30 connection procedure fails.

The request network messages between the mobile terminal MT1, MT2 and the network NW1 are advantageously sent using a default connection-initiating bearer.

- 35 It is also possible that the called mobile terminal MT2 is communicating with another mobile network than the calling mobile terminal MT1. In such a situation the process is slightly different from the situation where

the calling mobile terminal MT1 and the called mobile terminal MT2 are communicating in the same mobile network. It is apparent to a person skilled in the art that the above mentioned phases which are carried out in one mobile network NW1, can be implemented in several networks
5 NW1, NW2.

This scheme also applies in the situation where the mobile terminal first, before performing the bearer service request to the serving network, negotiates the preferred bearer service parameters with the
10 service party, which may be a network element, e.g. a service provider's server, in a remote (e.g. IP) network.

In some cases it may not be sufficient that the serving network only checks its own capabilities and traffic situations relating to bearer
15 service request. If the mobile terminal is trying to initiate a service, which also needs connection to a network other than the serving network, the serving network may also check the situation and capabilities of the other network. This is achieved advantageously by a standard signalling interface (not shown) between different networks to
20 provide requests/responses about their capabilities and traffic situations. If such an interface is available, the serving network communicates with the other networks, which are needed in the service execution, and after getting responses from those networks, suggests a bearer service suitable for all the parties involved. For example, the
25 WMSC 4 in the serving network and the WMSC in the other network may communicate with each other like e.g. in normal roaming situation.

The invention is not limited solely to the embodiments presented above, but it can be modified within the scope of the appended claims.

Claims:

1. A method to select a bearer service for communication between a mobile terminal (MT1) and a mobile network (NW1), in which method at least one bearer service is implemented in the mobile network (NW1), **characterised** in that the method comprises at least the following steps:
- defining a set of requirements for the bearer service to be selected for communication,
 - obtaining information about selectable bearer services,
 - comparing said set of requirements for the bearer service and said obtained information about selectable bearer services, and
 - making a decision to accept or reject at least one of said selectable bearer services for communication based on said comparison.
- 15 2. A method according to claim 1, in which an application is executed in the mobile terminal (MT1), **characterised** in that said set of requirements for the bearer service to be selected for communication is defined at least on the basis of properties of said application.
- 20 3. A method according to claim 1 or 2, **characterised** in that said set of requirements for the bearer service to be selected for communication is defined at least on the basis of properties of the mobile terminal (MT1).
- 25 4. A method according to claim 1, 2 or 3, **characterised** in that said set of requirements for the bearer service to be selected for communication is defined at least on the basis of user preferences.
- 30 5. A method according to any of claims 1—4, **characterised** in that there is user subscription information stored in the mobile network (NW1), wherein in the method said set of requirements for the bearer service to be selected for communication is defined at least on the basis of properties of said user subscription information.
- 35 6. A method according to any of claims 1—5, **characterised** in that traffic capacity of the mobile network (NW1) is limited, wherein in the method said set of requirements for the bearer service to be selected

for communication is defined at least on the basis of traffic situation of the mobile network (NW1).

7. A method according to any of claims 1—6, **characterised** in that there is user subscription information stored in the mobile network (NW1), wherein in the method the bearer service to be selected for communication is accepted or rejected at least on the basis of properties of said user subscription information.
- 10 8. A method according to any of claims 1—7, **characterised** in that traffic capacity of the mobile network (NW1) is limited, wherein in the method the bearer service to be selected for communication is accepted or rejected at least on the basis of traffic situation of the mobile network (NW1).
- 15 9. A method according to any of claims 1—8, **characterised** in that said comparison is performed in the mobile network (NW1).
- 20 10. A method according to any of claims 1—8, **characterised** in that said comparison is performed in the mobile terminal (MT1).
- 25 11. A method according to any of claims 1—10, **characterised** in that there is at least one quality of service class defined in the mobile network (NW1), that for at least one quality of service class there is implemented at least one bearer service, and that for an application to be executed a preferred quality of service class is defined.
12. A method according to any of claims 1—11, **characterised** in that the method comprises further the steps of:
- 30 – forming a bearer service request network message on the basis of said set of requirements for the bearer service to be selected for communication in the mobile terminal (MT1),
– sending said bearer service request network message to the mobile network (NW1),
- 35 – forming a bearer service reply network message on the basis of said selectable bearer services and said bearer service request network message in the mobile network (NW1), and

- sending said bearer service reply network message to the mobile terminal (MT1).
- 5 13. A method according to any of claims 1—12, **characterised** in that in the method a renegotiation phase is carried out, which renegotiation phase comprises at least steps of:
- defining a new set of requirements for the bearer service to be selected for communication in the mobile terminal (MT1),
 - forming a bearer service request network message on the basis of 10 the new set of requirements for the bearer service to be selected for communication,
 - sending said bearer service request network message to the mobile network (NW1),
 - forming a bearer service reply network message on the basis of 15 said bearer service request network message and said obtained information about bearer services selectable in the mobile network (NW1),
 - sending said bearer service reply network message to the mobile terminal (MT1),
- 20 wherein a decision to accept or reject a bearer service for communication is made based on said comparison in the mobile terminal (MT1).
- 25 14. A method according to any of claims 1—12, **characterised** in that in the method a renegotiation phase is carried out, which renegotiation phase comprises at least steps of:
- defining a new set of requirements for the bearer service to be selected for communication in the mobile terminal (MT1),
 - forming a bearer service request network message on the basis of 30 the new set of requirements for the bearer service to be selected for communication,
 - sending said bearer service request network message to the mobile network (NW1),
 - forming a bearer service reply network message on the basis of said 35 bearer service request network message and said obtained information about bearer services selectable in the mobile network (NW1),

- sending said bearer service reply network message to the mobile terminal (MT1),

wherein a decision to accept or reject a bearer service for communication is made based on said comparison in the mobile network (NW1).

5

15. A method according to any of claims 1—14, **characterised** in that in the method a renegotiation phase is carried out for selecting a new bearer service when conditions of the mobile network (NW1) have changed, which renegotiation phase comprises at least the steps of:

10

- forming in the mobile network (NW1) a conditions changed network message on the basis of the changed conditions, in which network message a new bearer service is suggested,
- sending said conditions changed network message to the mobile terminal (MT1),
- examining said conditions changed network message in the mobile terminal (MT1),

15

wherein one of the following steps is performed in the mobile terminal (MT1):

20

- accepting the new bearer service, if said new bearer service fulfils requirements for the bearer service, wherein the communication between said mobile terminal (MT1) and said mobile network (NW1) in connection with execution of said application is continued with said new bearer service, or
- rejecting the new bearer service, if said new bearer service does not fulfil requirements for the bearer service, wherein the communication between said mobile terminal (MT1) and said mobile network (NW1) in connection with execution of said application is stopped.

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16. A method according to any of claims 1—15, **characterised** in that in the method a renegotiation phase is carried out for selecting a new bearer service when conditions of the mobile network (NW1) have changed, which renegotiation phase comprises at least the steps of:

35

- forming in the mobile network (NW1) a conditions changed network message on the basis of the changed conditions,
- sending said conditions changed network message to the mobile terminal (MT1),

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- examining said conditions changed network message in the mobile terminal (MT1),
– forming a new bearer service request network message in the mobile terminal (MT1),
5 – sending said bearer service request network message to the mobile network (NW1),
wherein one of the following steps is performed in the mobile network (NW1):
- 10 – accepting the new bearer service, if said new bearer service fulfils requirements for the bearer service, wherein the communication between said mobile terminal (MT1) and said mobile network (NW1) in connection with execution of said application is continued with said new bearer service, or
15 – rejecting the new bearer service, if said new bearer service does not fulfil requirements for the bearer service, wherein the communication between said mobile terminal (MT1) and said mobile network (NW1) in connection with execution of said application is stopped.
- 20 17. A method according to any of claims 1—16, **characterised** in that there is provided an execution environment and a bearer service selection application programming interface in the mobile terminal (MT1), and that said bearer service selection application programming interface is used in communication between at least one application and said execution environment.
25
18. A method according to any of claims 1—17, **characterised** in that there is provided means (402) for obtaining information about the capabilities of the mobile terminal (MT1).
- 30 19. A method according to any of claims 1—18, **characterised** in that there is provided means (404) for obtaining information about user preferences.
- 35 20. A method according to any of claims 1—19, **characterised** in that the user of the mobile terminal (MT1) is informed of the selectable bearer services, wherein the user can perform the selection of the bearer service.

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21. A method to select a bearer service for communication between at least two mobile terminals (MT1, MT2), in which communication is established with a mobile network (NW1), **characterised** in that the
- 5 method comprises at least the following steps:
- defining a set of requirements for the bearer service in the first mobile terminal (MT1),
 - obtaining information about selectable bearer services in the mobile network (NW1),
- 10 – comparing said set of requirements for the bearer service and said obtained information about bearer services selectable in the mobile network (NW1), and
- making a decision to accept or reject at least one of said selectable bearer services for communication between the first mobile terminal
- 15 (MT1) and the mobile network (NW1) based on said comparison, wherein, if at least one bearer service is accepted for communication between the first mobile terminal (MT1) and the mobile network (NW1), the following steps are performed:
- sending information about the accepted bearer service to the second mobile terminal (MT2),
 - examining, if the accepted bearer service can be used in communication with the second mobile terminal (MT2) and the mobile network (NW1),
- 25 wherein, if a bearer service is accepted for communication between the second mobile terminal (MT2) and the mobile network (NW1), a communication is set up between the mobile terminals (MT1, MT2) and the mobile network (NW1), in which communication the accepted bearer service is used.
- 30
22. A method according to claim 21, **characterised** in, that if the bearer service accepted for communication between the first mobile terminal (MT1) and the mobile network (NW1) is not accepted for communication between the second mobile terminal (MT2) and the mobile network (NW1), selection of a new bearer service is initiated by the first mobile terminal (MT1).
- 35

23. A method according to claim 21, **characterised** in, that if the bearer service accepted for communication between the first mobile terminal (MT1) and the mobile network (NW1) is not accepted for communication between the second mobile terminal (MT2) and the mobile network (NW1), the second mobile terminal (MT2) proposes another bearer service to be accepted for communication.
- 5
24. A method according to claim 21, **characterised** in, that if the bearer service accepted for communication between the first mobile terminal (MT1) and the mobile network (NW1) is not accepted for communication between the second mobile terminal (MT2) and the mobile network (NW1), communication is terminated between the second mobile terminal (MT2) and the mobile network (NW1).
- 10
- 15 25. A method to select a bearer service for communication between at least two mobile terminals (MT1, MT2), in which method the first mobile terminal (MT1) is communicating with one mobile network (NW1), and the second mobile terminal (MT2) is communicating with a second mobile network (NW2), **characterised** in that the method comprises at least the following steps:
- 20
- selecting a bearer service for communication between the first mobile terminal (MT1) and the first mobile network (NW1) ,
 - examining, if the selected bearer service can be used in communication between the second mobile terminal (MT2) and said second mobile network (NW2),
 - sending a reply to the first mobile terminal (MT1) based on the result of the examination,
- 25
- wherein, if the selected bearer service is accepted for communication between the second mobile terminal (MT2) and the second mobile network (NW2), a communication is set up between the mobile terminals (MT1, MT2) and said mobile networks (NW1, NW2).
- 30
- 35 26. A communication system which comprises at least a mobile terminal (MT1), a mobile network (NW1), at least one bearer service implemented in the mobile network (NW1), and means (4, 11, 201, 403, 405) for selecting a bearer service for communication between said mobile terminal (MT1) and said mobile network (NW1), **characterised** in that the system further comprises:

- means (CPU, MEM) for defining a set of requirements for the bearer service,
 - means (CPU, MEM) for obtaining information about selectable bearer services,
- 5 – means (4, 11) for comparing said set of requirements for the bearer service and said obtained information about selectable bearer services, and
- means (4, MT1) for making a decision to accept or reject at least one of said selectable bearer services for communication based on said comparison.
- 10
27. A communication system according to claim 26, in which system the mobile terminal (MT1) comprises means (CPU, MEM) for executing an application, **characterised** in that means (CPU, MEM) for defining a set of requirements for the bearer service comprises means (401) for defining said set of requirements for the bearer service at least on the basis of properties of said application.
- 15
28. A communication system according to claim 26 or 27, **characterised** in that means (CPU, MEM) for defining a set of requirements for the bearer service comprises means (402, 403) for defining said set of requirements for the bearer service at least on the basis of properties of the mobile terminal (MT1).
- 20
29. A communication system according to claim 26, 27 or 28, in which the mobile terminal (MT1) comprises means (CPU, MEM) for executing an application, **characterised** in that the system comprises means (404, 405) for defining the bearer service at least on the basis of user preferences.
- 25
30. A communication system according to any of claims 26—29, **characterised** in that the mobile network (NW1) comprises means for storing user subscription information, wherein the system comprises means (404, 405) for defining the bearer service at least on the basis of said user subscription information.
- 35
31. A communication system according to any of claims 26—30, **characterised** in that traffic capacity of the mobile network (NW1) is

limited, wherein the means (CPU, MEM) for defining a set of requirements for the bearer service comprises means (1, 4, 5) for defining said set of requirements for the bearer service at least on the basis of traffic situation of the mobile network (NW1).

5

32. A communication system according to any of claims 26—31, **characterised** in that the mobile network (NW1) comprises means for storing user subscription information, wherein the system comprises means (404, 405) for accepting or rejecting the bearer service at least on the basis of said user subscription information.

10

33. A communication system according to any of claims 26—32, **characterised** in that traffic capacity of the mobile network (NW1) is limited, wherein the means (CPU, MEM) for accepting or rejecting a set of requirements for the bearer service comprises means (1, 4, 5) for defining said set of requirements for the bearer service at least on the basis of traffic situation of the mobile network (NW1).

15

34. A communication system according to any of claims 26—33, **characterised** in that said means (4, 11) for comparing said set of requirements for the bearer service and said obtained information about selectable bearer services are formed in the mobile network (NW1).

20

35. A communication system according to any of claims 26—34, **characterised** in that said means (4, 11) for comparing said set of requirements for the bearer service and said obtained information about selectable bearer services are formed in the mobile terminal (MT1).

25

36. A communication system according to any of claims 26—35, **characterised** in that there is at least one quality of service class defined in the mobile network (NW1), that for at least one quality of service class there is defined at least one bearer service, and that for an application to be executed a preferred quality of service class is defined.

37. A communication system according to any of claims 26—36, **characterised** in that the mobile terminal (MT1) comprises:

- means (CPU) for forming a bearer service request network message on the basis of said set of requirements for the bearer service,

5 – means (RF) for sending said bearer service request network message to the mobile network (NW1),

and that the mobile network (NW1) comprises:

- means (4) for forming a bearer service reply network message on the basis of said selectable bearer services and said bearer service

10 request network message, and

- means (2, 3) for sending said bearer service reply network message to the mobile terminal (MT1).

38. A communication system according to any of claims 26—37, **characterised** in that it comprises means for renegotiating a bearer

15 service, wherein the mobile terminal (MT1) comprises:

- means (CPU) for defining a new set of requirements for the bearer service,

- means (CPU) for forming a bearer service request network message on the basis of the new set of requirements for the bearer service, and

- means (RF) for sending said bearer service request network message to the mobile network (NW1),

and that the mobile network (NW1) comprises:

- means for forming a bearer service reply network message on the basis of said bearer service request network message, and

- means for sending said bearer service reply network message to the mobile terminal (MT1).

- wherein the mobile terminal (MT1) further comprises means (4) for making a decision to accept or reject at least one of said selectable bearer services for communication based on said comparison.

39. A communication system according to any of claims 26—38, **characterised** in that it comprises means for renegotiating a bearer

35 service, when conditions of the mobile network (NW1) have changed, wherein the mobile network (NW1) further comprises:

- means for forming a conditions changed network message on the basis of the changed conditions, in which network message a new bearer service is suggested, and

- means for sending said conditions changed network message to the mobile terminal (MT1),

and the mobile terminal (MT1) further comprises:

- means for examining said conditions changed network message,
- means for accepting the change of the bearer service, if said new bearer service fulfils said set of requirements for a bearer service,

wherein the communication between said mobile terminal (MT1) and said mobile network (NW1) in connection with execution of said application is continued with said new bearer service, and

- means for rejecting the change of the bearer service, if said new bearer service does not fulfil said set of requirements for a bearer service, wherein the communication between said mobile terminal (MT1) and said mobile network (NW1) in connection with execution of said application is stopped.

40. A communication system according to any of claims 26—39, characterised in that the mobile terminal (MT1) comprises an execution environment and a bearer service selection application programming interface (401), and that said selection application programming interface is used in communication between at least one application and said execution environment.

41. A communication system according to any of claims 26—40, characterised in that the mobile terminal (MT1) comprises means for informing the user of the selectable bearer services, and means for selecting the bearer service by the user.

42. A mobile terminal (MT1) for use in a communication system which comprises at least a mobile network (NW1), at least one bearer service implemented in the mobile network (NW1), and means (4, 11, 201, 403, 405) for selecting a bearer service for communication between said mobile terminal (MT1) and said mobile network (NW1), characterised in that the mobile terminal (MT1) further comprises means (CPU, MEM) for defining a set of requirements for the bearer service.

43. A mobile terminal (MT1) according to claim 42, **characterised** in that it comprises means for defining said set of requirements for the bearer service to be selected for communication at least on the basis of properties of an application.
- 5 44. A mobile terminal (MT1) according to claim 42 or 43, **characterised** in that it comprises means for defining said set of requirements for the bearer service to be selected for communication at least on the basis of properties of the mobile terminal (MT1).
- 10 45. A mobile terminal (MT1) according to claim 42, 43 or 44, **characterised** in that it comprises means for defining said set of requirements for the bearer service to be selected for communication at least on the basis of user preferences.
- 15 46. A mobile terminal (MT1) according to claim 42, 43, 44 or 45, **characterised** in that it comprises means for obtaining information about selectable bearer services in the mobile network (NW1), and means for comparing said set of requirements for the bearer service and said obtained information about selectable bearer services.
- 20 47. A mobile terminal (MT1) according to claim 42, 43, 44, 45 or 46, **characterised** in that it comprises an execution environment (202) for executing applications.
- 25 48. A bearer selection application interface (BSSAPI) for use in a communication system which comprises at least a mobile network (NW1), at least one bearer service implemented in the mobile network (NW1), and means (4, 11, 201, 403, 405) for selecting a bearer service for communication between a mobile terminal (MT1) and said mobile network (NW1), and said mobile terminal (MT1) comprises an execution environment (202) for executing applications, **characterised** in that the bearer selection application interface (BSSAPI) is arranged to transfer information between at least one application and said execution environment for defining a set of requirements for the bearer service.
- 30
- 35

49. A network element in a communication system which comprises at least a mobile terminal (MT1), a mobile network (NW1), at least one bearer service implemented in the mobile network (NW1), and means (4, 11, 201, 403, 405) for selecting a bearer service for

5 communication between said mobile terminal (MT1) and said mobile network (NW1), **characterised** in that network element comprises:

- means for receiving a set of requirements for the bearer service from the mobile terminal,
- means for obtaining information about selectable bearer services,
- 10 – means for comparing said set of requirements for the bearer service and said obtained information about selectable bearer services, and
- means (4) for making a decision to accept or reject at least one of said selectable bearer services for communication based on said comparison.

15

50. A network element in a communication system which comprises at least a mobile terminal (MT1), a mobile network (NW1), at least one bearer service implemented in the mobile network (NW1), and means (4, 11, 201, 403, 405) for selecting a bearer service for

20 communication between said mobile terminal (MT1) and said mobile network (NW1), **characterised** in that network element comprises:

- means for obtaining information about selectable bearer services,
- means (4) for providing obtained information about selectable bearer services to the mobile terminal (MT1).

25

00000000000000000000000000000000

(57) Abstract

The invention relates to a method to select a bearer service for communication between a mobile terminal (MT1) and a mobile network (NW1). In the method at least one bearer service is implemented in the mobile network (NW1). The method comprises at least the following steps:

- defining a set of requirements for the bearer service,
- obtaining information about selectable bearer services,
- comparing said set of requirements for the bearer service and said obtained information about selectable bearer services, and
- making a decision to accept or reject at least one of said selectable bearer services for communication based on said comparison.

Figs. 2a, 2b, 2c

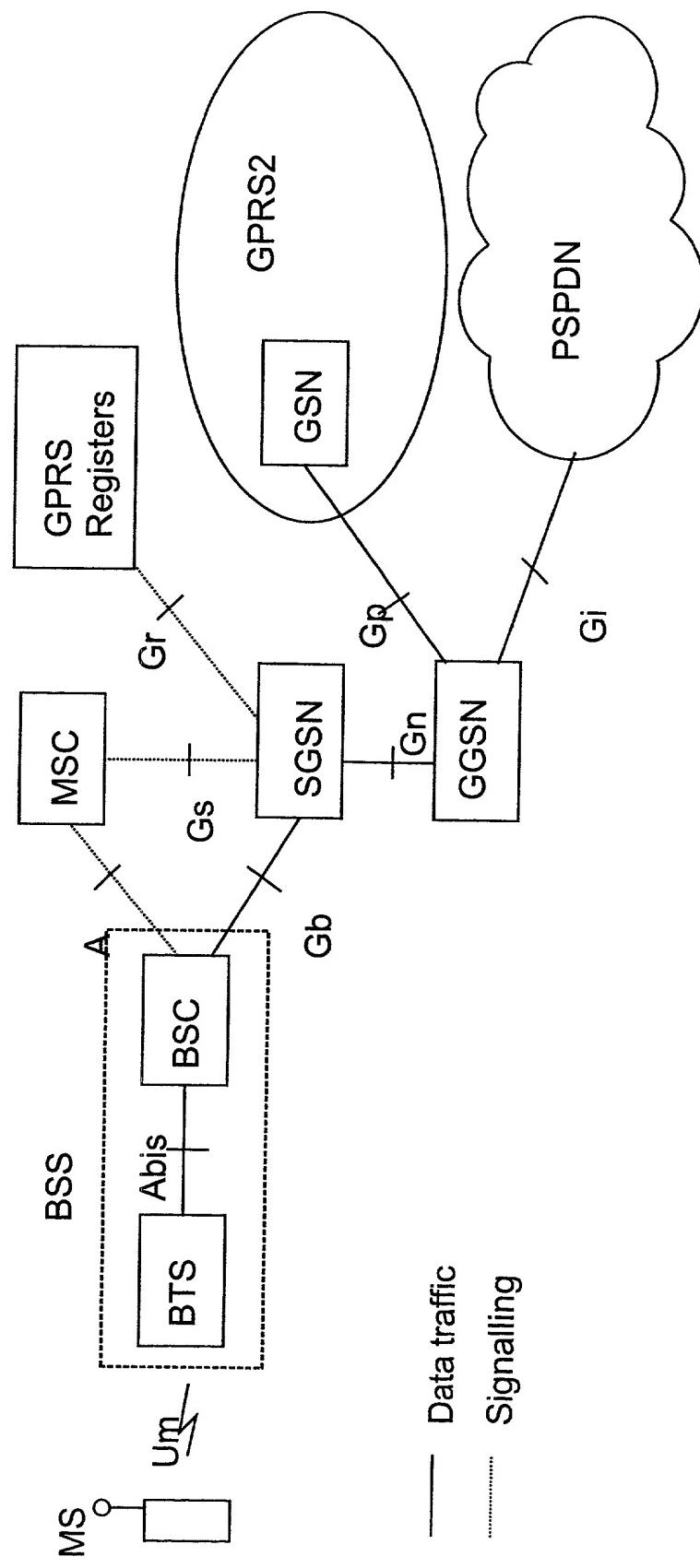


Fig. 1a

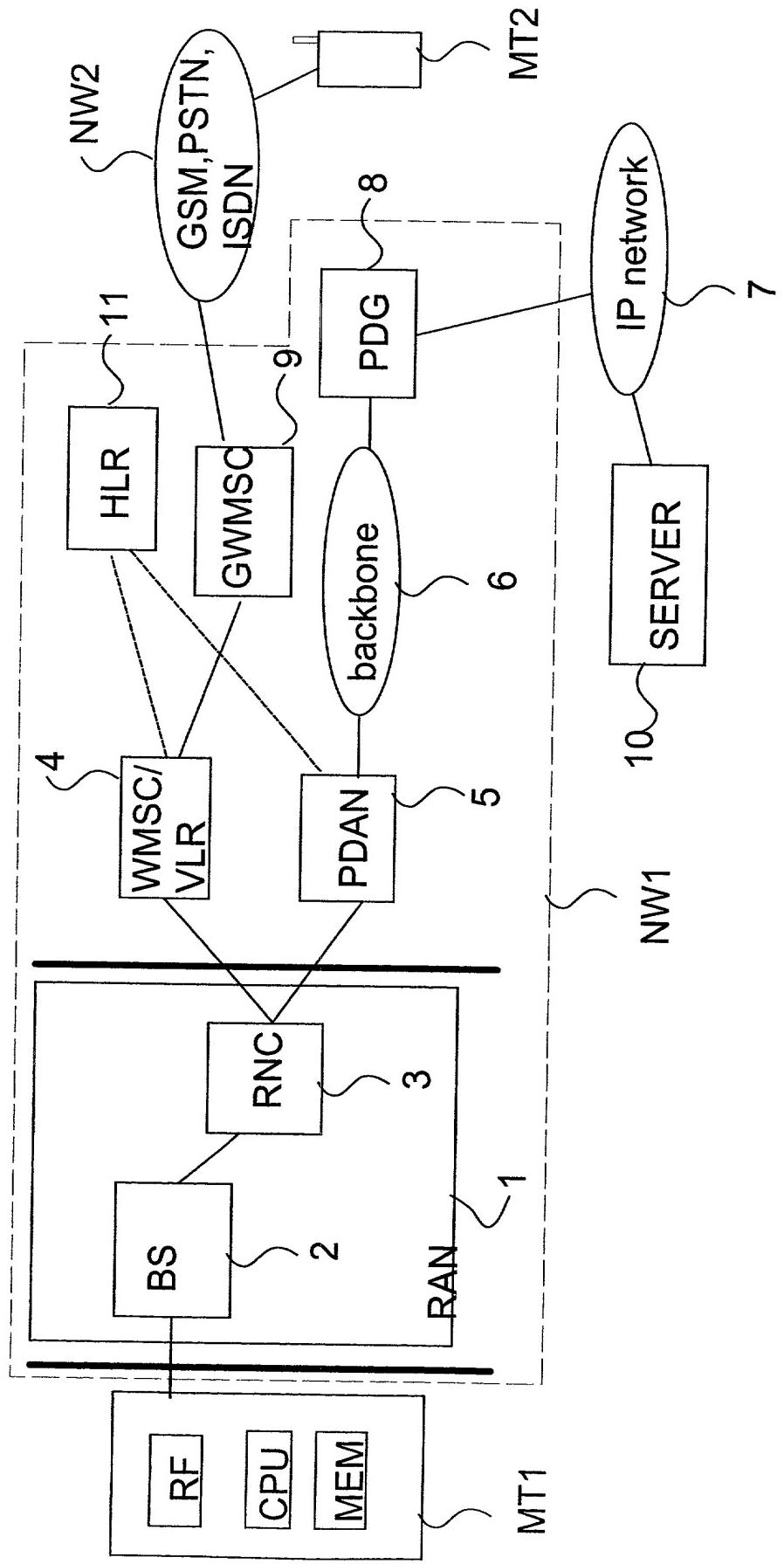


Fig. 1b

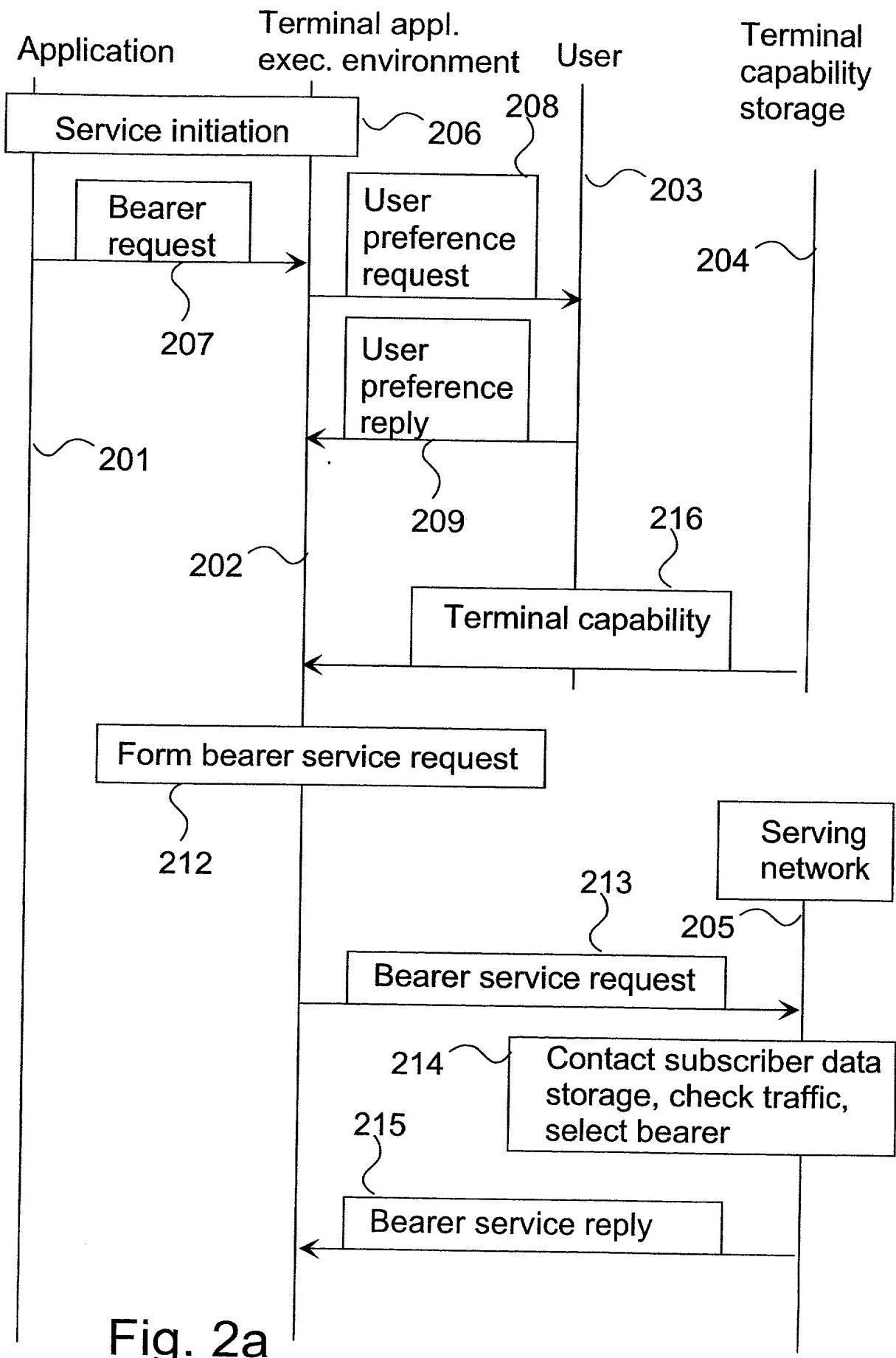


Fig. 2a

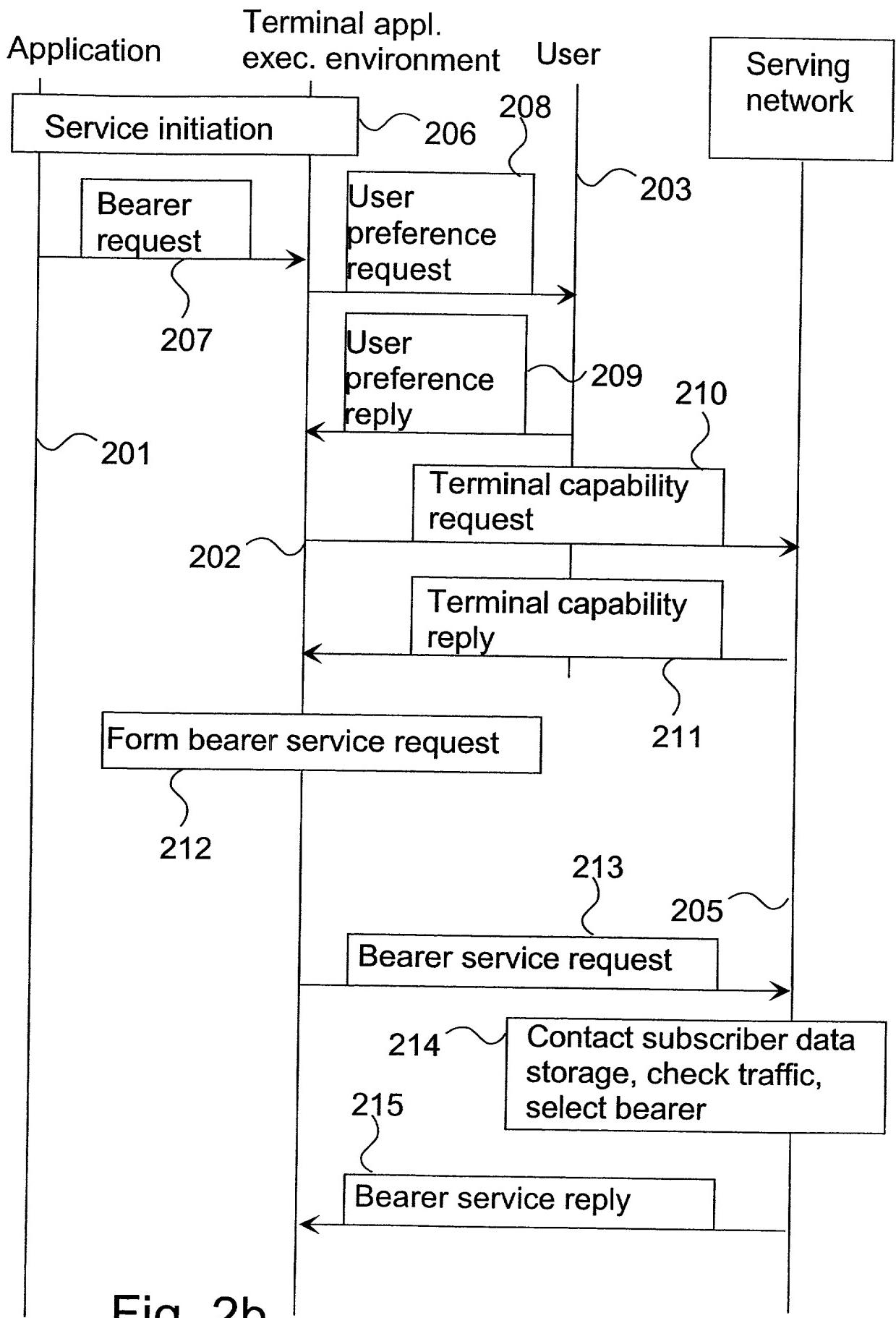


Fig. 2b

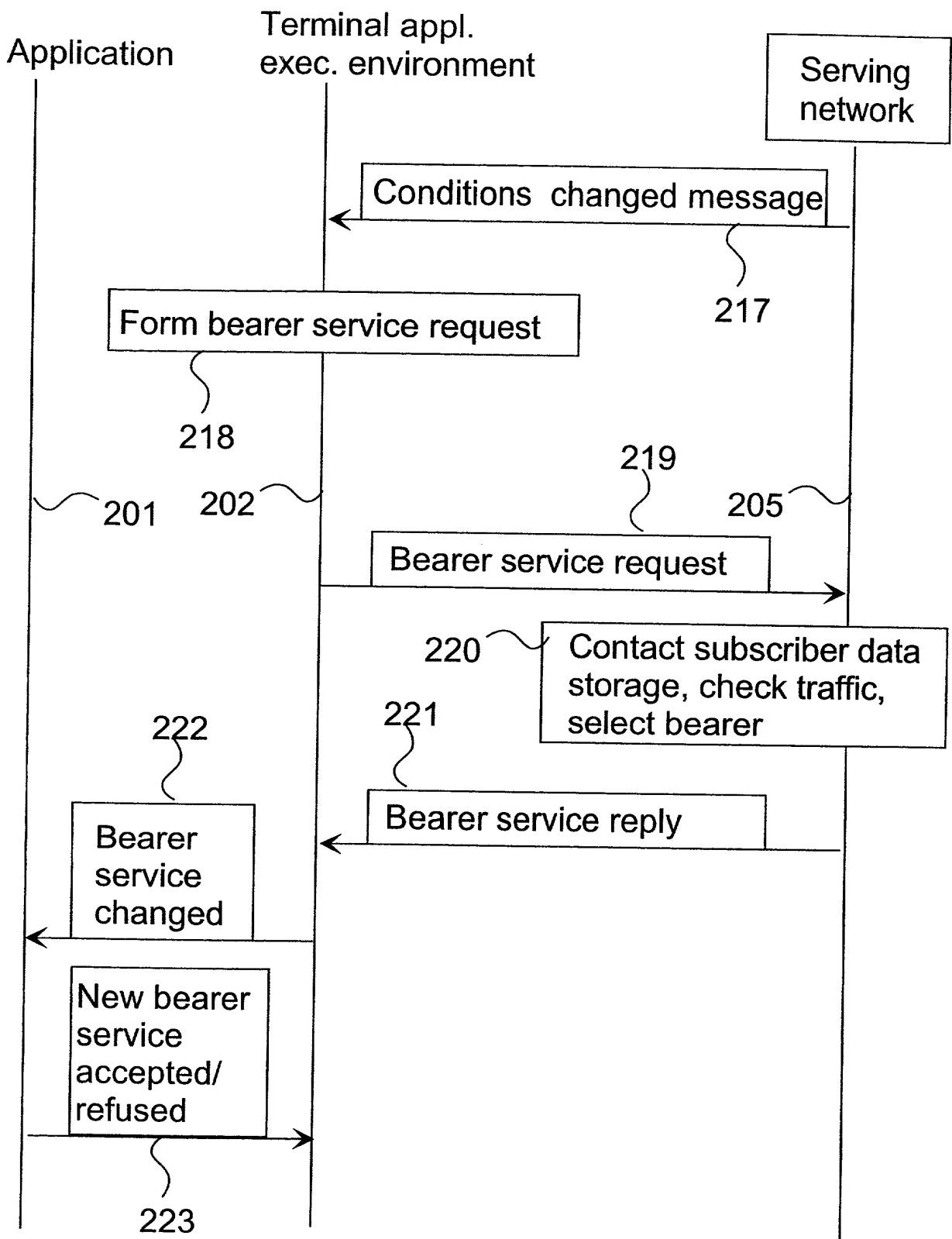


Fig. 2c

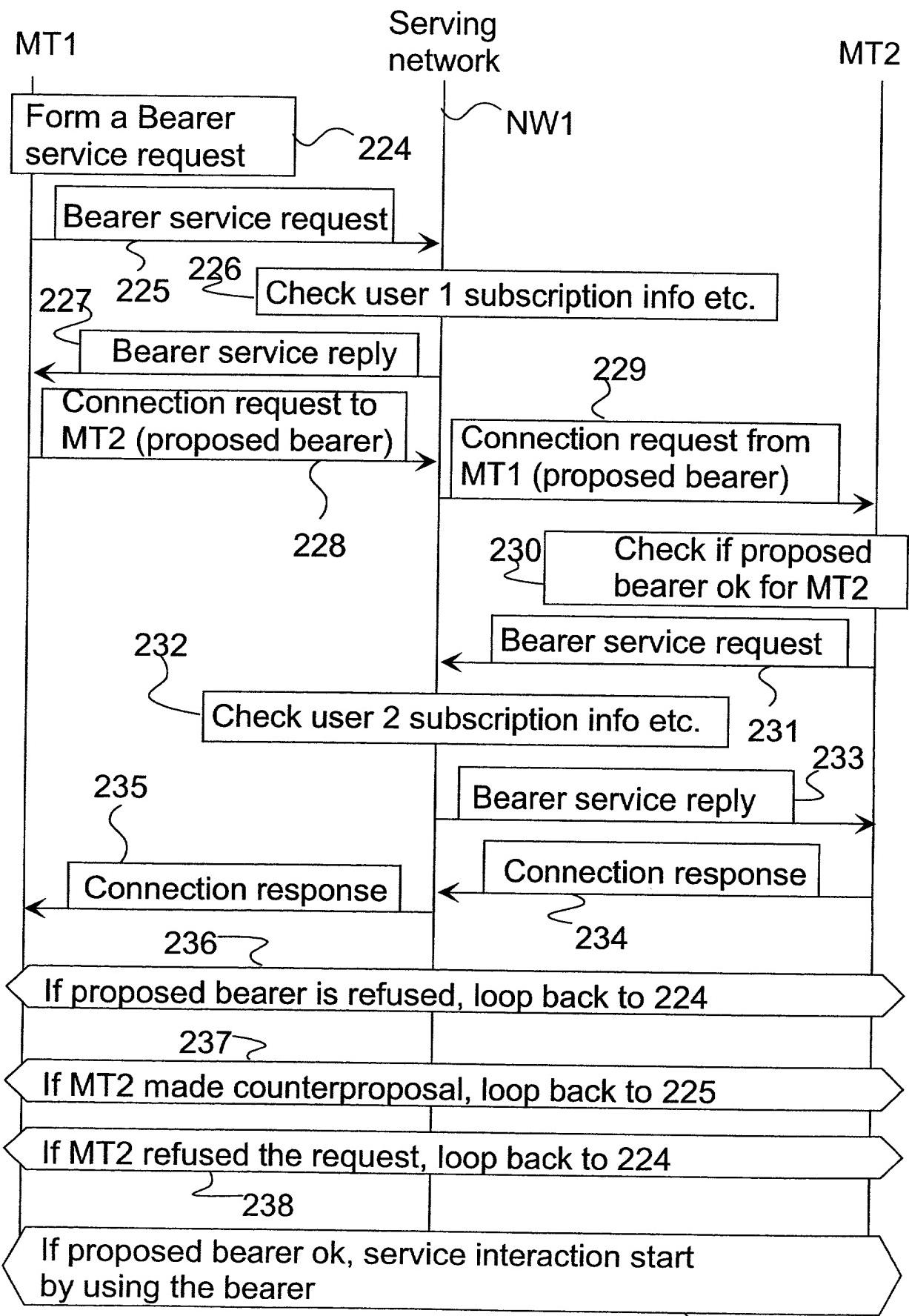


Fig. 2d

Header	QoS-parameters	Traffic requirements	Estimated capacity requirement	Traffic class
302	303	304	305	306
Header	Identification of bearer	Details of granted bearer		
302	308	309		307
Header	Identification of bearer	Details of changed bearer		
302	308	309		310
Header	Id of bearer	QoS-parameters	Traffic requirements	Traffic class
302	308	303	304	305
Header	Id of bearer	QoS-parameters	Estimated capacity requirement	Traffic class
302	308	303	304	306

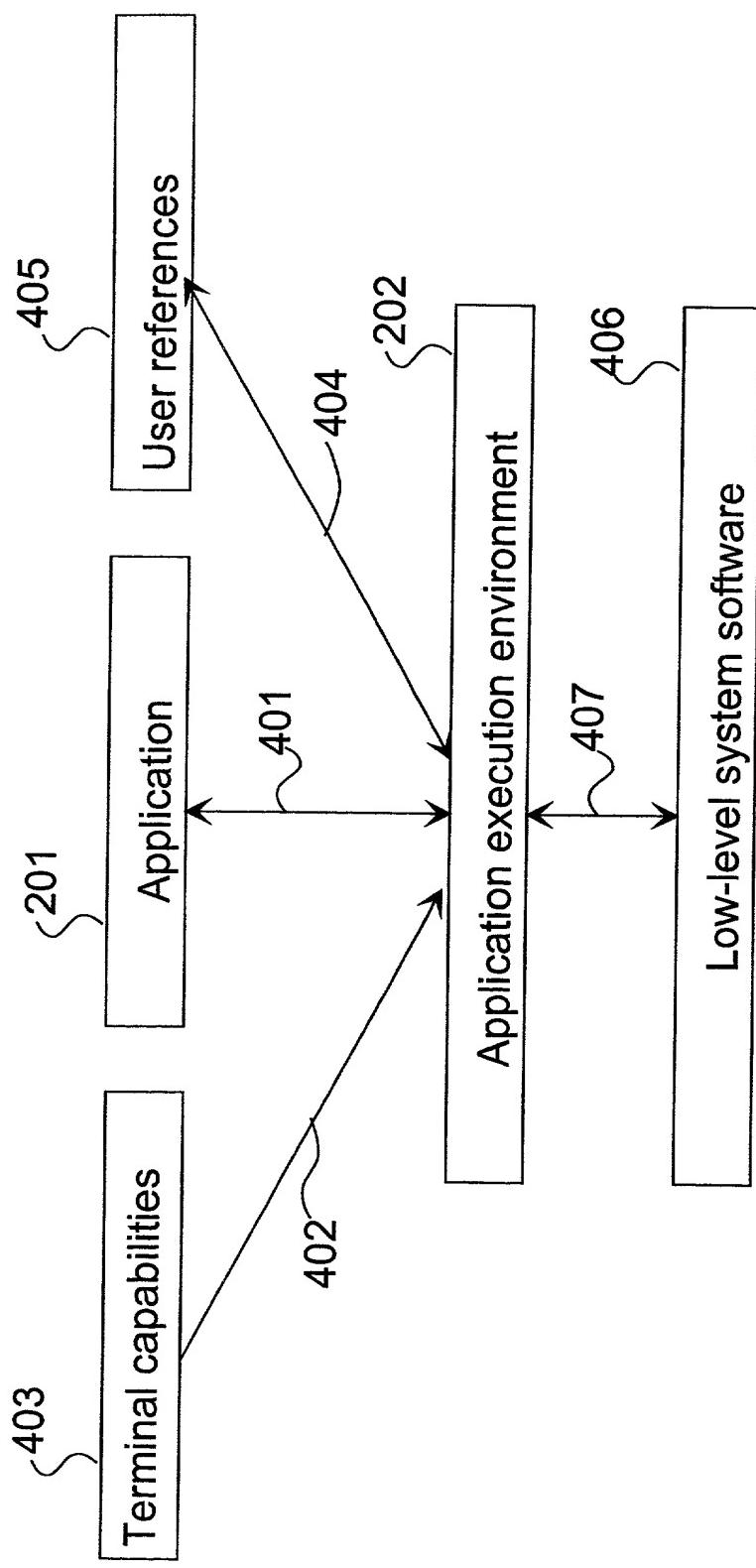
Fig. 3a

Fig. 3b

Fig. 3c

Fig. 3d

Fig. 4



COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL,
DIVISIONAL, CONTINUATION OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type:

(check one applicable item below)

- original.
 design.
 supplemental.

NOTE: *If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item; check appropriate one of last three items.*

- national stage of PCT.

NOTE: *If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P.*

- divisional.
 continuation.
 continuation-in-part (C-I-P).

INVENTORSHIP IDENTIFICATION

WARNING: *If the inventors are each not the inventors of all the claims, an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.*

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am the original, first and sole inventor (*if only one name is listed below*) or an original, first and joint inventor (*if plural names are listed below*) of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

Method for selecting a bearer service for a service in a mobile telecommunications system

SPECIFICATION IDENTIFICATION

the specification of which:

(complete (a), (b), or (c))

- (a) is attached hereto
- (b) was filed on _____ as Serial No. 0/ _____
or Express Mail No., As Serial No. not yet known _____
and was amended on _____ (if applicable).

NOTE: Amendments filed after the original papers are deposited with the PTO that contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 CFR 1.67.

- (c) was described and claimed in PCT International Application No. _____, filed on _____ and as
amended under PCT Article 19 on _____ (if any).

ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56,

(also check the following items, if desired)

- and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, and
 in compliance with this duty, there is attached an information disclosure statement, in accordance with 37 CFR 1.98.

PRIORITY CLAIM (35 U.S.C § 119(a)-(d))

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

(complete (d) or (e))

(d) no such applications have been filed.

(e) such applications have been filed as follows.

NOTE: where item (c) is entered above and the International Application which designated the U.S. itself claimed priority check item (e), enter the details below and make the priority claim.

**PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION
AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119(a)–(d)**

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119
Finland	19991692	9 August 1999	<input checked="" type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>

**CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S)
(34 U.S.C. § 119(e))**

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

PROVISIONAL APPLICATION NUMBER

FILING DATE

/	_____
/	_____
/	_____
/	_____
/	_____

**CLAIM FOR BENEFIT OF EARLIER US/PCT APPLICATION(S)
UNDER 35 U.S.C. 120**

- The claim for the benefit of any such applications are set forth in the attached ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART (C-I-P) APPLICATION

**ALL FOREIGN APPLICATION(S), IF ANY, FILED MORE THAN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION**

NOTE: If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-I-P APPLICATION for benefit of the prior U.S. or PCT application(s) under 35 U.S.C. § 120.

POWER OF ATTORNEY

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

(list name and registration number)

Clarence A. Green (24,622)
Mark F. Harrington (31,686)

(check the following item, if applicable)

Attached, as part of this declaration and power of attorney, is the authorization of the above-named attorney(s) to accept and follow instructions from my representative(s).

SEND CORRESPONDENCE TO

Clarence A. Green
Perman & Green, LLP
425 Post Road
Fairfield, CT 06430

DIRECT TELEPHONE CALLS TO:

(Name and telephone number)
Clarence A. Green
(203) 250-1800

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE(S)

NOTE: Carefully indicate the family (or last) name, as it should appear on the filing receipt and all other documents.

Full name of sole or first inventor

Satu

(GIVEN NAME)

(MIDDLE INITIAL OR NAME)

Mäkelä

FAMILY (OR LAST NAME)

Inventor's signature



Date

21 July 2000

Country of Citizenship

Finland

Residence

Koulukatu 16 A 10 FIN-33200 Tampere, Finland

Post Office Address

Koulukatu 16 A 10 FIN-33200 Tampere, Finland

Full name of second joint inventor, if any

Jouni

(GIVEN NAME)

(MIDDLE INITIAL OR NAME)

Smolander

FAMILY (OR LAST NAME)

Inventor's signature



Date

21 July 2000

Country of Citizenship

Finland

Residence

Pellervonkatu 22 A 13, FIN-33540 Tampere, Finland

Post Office Address

Pellervonkatu 22 A 13, FIN-33540 Tampere, Finland

Full name of third joint inventor, if any

(GIVEN NAME)

MIDDLE INITIAL OR NAME

FAMILY (OR LAST NAME)

Inventor's signature



Date

Country of Citizenship

Residence



Post Office Address



*(check proper box(es) for any of the following added page(s)
that form a part of this declaration)*

Signature for fourth and subsequent joint inventors. *Number of pages added* _____

* * *

Signature by administrator(trix), executor(trix) or legal representative for deceased or
incapacitated inventor. *Number of pages added* _____

* * *

Signature for inventor who refuses to sign or cannot be reached by person authorized
under 37 CFR 1.47. *Number of pages added* _____

* * *

Added page for **signature** by one joint inventor on behalf of deceased inventor(s) where legal
representative cannot be appointed in time. (37 CFR 1.47)

* * *

Added pages to combined declaration and power of attorney for divisional, continuation, or
continuation-in-part (C-I-P) application.

Number of pages added _____

* * *

Authorization of attorney(s) to accept and follow instructions from representative.

* * *

*(if no further pages form a part of this Declaration,
then end this Declaration with this page and check the following item)*

This declaration ends with this page.